AUSTRALIAN MUSEUM

SCIENCE STRATEGY 2014–2017

Australian Museum Research Institute, Science and Learning Division

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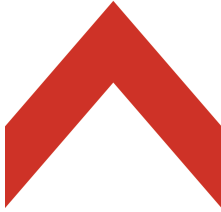AUSTRALIAN MUSEUM

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Feedback

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ABOUT AUSTRALIAN MUSEUM SCIENCE AND RESEARCH

As the first natural history museum in the country, the Australian Museum has a long and distinguished history of scientific endeavour.

Since 1827, the Australian Museum (AM) has played a key role in understanding Australia's biodiversity, geodiversity and cultural diversity. Its natural history and cultural collections are accessed by researchers worldwide, leading to many insights into the development of the planet and the life it supports. Our science is complemented by traditional Indigenous knowledge about the natural world. We gain greatly from being able to integrate, respect and learn from Aboriginal and Torres Strait Islanders' rich and ancient traditions.

More recently, we have applied our knowledge from research, collections, and science education to help solve some critical issues facing the natural world, in particular biosecurity, the environmental impacts of climate change on biodiversity and the management of pest species and other biosecurity concerns.

From July 2013, the AM's Science and Learning Division brings together science, technical and learning services specialists to help meet the AM's broad objectives.

Objectives

The collection, with over 18 million objects and specimens, is the largest in the southern hemisphere, and our scientific workforce in the biodiversity arena is without peer in the AM sector.

The AM conducts its collecting and research under the Australian Museum Trust Act 1975 (NSW), with specific objectives to:

- propagate knowledge about the natural environment of Australia and to increase that knowledge

- give particular emphasis to propagating and increasing and applying knowledge in the natural sciences of biology, anthropology and geology.

Australian Museum Research Institute

In September 2013 the AM established the Australian Museum Research Institute (AMRI) to provide a stronger cohesive presence in the research world and a vehicle for wider promotion of our scientific work.

AMRI comprises scientific infrastructure, research and collections staff, Senior Fellows, Research Associates and their postgraduate students. Its scope covers the full range of our geoscience, biological and archaeological research with a strong emphasis on the AM's 6 strategic research focus areas.

Australian Centre for Wildlife Genomics

The AM's Australian Centre for Wildlife Genomics provides essential services in DNA identification and genomics-based research. The Centre assists state and federal government agencies in managing wildlife smuggling, fisheries breaches, suspected quarantine incursions and aviation safety.

The Centre is conducting the Koala Genome project, one of the first Australian-led mammalian genome projects. In addition to critical conservation outcomes for the Koala, the project will enhance next-generation sequencing and data-handling expertise within Australia. Established in 2012, the Centre is one of the few laboratories to have attained NATA (National Association of Testing Authorities) accreditation for wildlife forensic work in the region.

Australian Museum Centre for Citizen Science

In April 2015 the Australian Museum Centre for Citizen Science (AMCCS) was launched. The scope of the AMCCS includes disciplines of biodiversity, geodiversity and human impacts on culture and nature; it will include field-based and web-based crowdsourcing, and will collaborate with and engage other museums, universities, herbaria, government agencies and community groups.

The Australian Museum aims to be a leader of citizen science, not just in Australia and the Southern Hemisphere, but in the world. AMCCS will develop a citizen science program that will identify, develop and implement citizen science projects that engage the Australian and International communities in increasing understanding of the natural world.

The AM will create a national citizen science initiative in 2015/16 giving the AM the potential to be the creators of a more scientifically literate society heading into the future.

Collaboration and Scientific Reach

Museum science benefits the wider community in ways such as:

- discover previously unknown species from our backyards and beyond

- inform wildlife conservation decisions to protect threatened species from extinction

- fight wildlife trafficking and protect our country from introduced pests

- make air travel safer

- foster understanding and appreciation of cultural differences for a more socially inclusive society through our anthropological and archaeological research.

Many of our scientific staff are world experts in particular groups of animals. They also bring science to the community, inspire passion for our shared planet and spark conversations about the future through exhibitions, learning programs, interviews, articles, blogs, presentations and citizen science.

Collaboration with other research institutions, natural resource managers, indigenous groups, and the wider community will be the key to our success. Collaboration adds the crucial dimension required to address some of the most pressing multi-dimensional environmental issues today.

Science funding

Our scientific activities are funded by recurrent funding from the NSW Government through the Department Justice (from 1 July 2015) combined with external sources that include:

- Australian and State Government grants
- foundations (including the Australian Museum Foundation)
- local councils
- consultancies
- philanthropic gifts

A STRATEGY FOR SCIENCE AT THE AUSTRALIAN MUSEUM

Focus

This Science Strategy focuses on our research in biology, geology, archaeology and anthropology together with collections, scientific infrastructure and engagement. In an increasingly challenging financial climate we need to focus our research effort where it can have the greatest impact and be seen to have merit. To do this we need to:

- build on our existing strengths in research, collections and infrastructure

- develop stronger synergies across our capabilities

- collaborate strategically with like-minded organisations

- effectively communicate how we are making a difference.

Areas of strategic research focus: EXPLORE | DISCOVER | APPLY

The strategy represents a shift in the work that we do and the way that we do it. It promotes a stronger focus in areas where we are able to make significant contributions in key areas of current concern to Australians. The AM'sscience will meet the criteria "EXPLORE", "DISCOVER" and "APPLY" in the following areas of strategic research focus:

1. **Use our research and collections expertise to understand and ameliorate the environmental impacts of climate change on biodiversity**

2. **Contribute to the understanding and management of biosecurity threats**

3. **Discover and understand biodiversity to inform effective animal conservation**

4. **Apply wildlife genomics to solve key problems.**

5. **Generate knowledge to maximise benefits from Australia's geological and biological resources**

6. **Foster understanding and appreciation of cultural differences for a more socially inclusive society through our anthropological and archaeological research.**

Priority areas' to meet our 'strategic research focus goals'

The five priority areas below are the means by which we will contribute to our areas of strategic research focus. Each priority area is outlined in the following pages:

1. *Natural science and archaeological research*

2. *Natural sciences collections*

3. *Science infrastructure*

4. *Digital access to museum collections and science*

5. *Science learning and engagement, including citizen science.*

PRIORITY AREA 1: NATURAL SCIENCE AND ARCHAEOLOGICAL RESEARCH

Research at the AMAM answers questions of scientific importance and societal relevance using our unique natural history and archaeological collections and expertise.

We will enhance our role as a leader in key areas of natural science, archaeology and innovative collections-based research. We will address major scientific questions in biodiversity, geodiversity and cultural diversity, strengthening our role as an engaging, inspiring and trusted voice on the natural and cultural worlds.

Our research aims to understand and respond to the challenges facing the planet, such as the environmental impacts of climate change, and to use our science to predict future challenges according to the strategic research focus areas.

Our strength lies in our ability to apply our expertise in evolution, taxonomy, systematics, geosciences, genomics, ecology, archaeology, and informatics to tackle scientific questions in novel ways.

Our integrative, collections-based approach combines molecular, geospatial, geochemical, phenomic and bioinformatic techniques. This approach sets us apart from universities and other research institutes, and gives us a unique perspective on the path to a better future.

By 2017 our natural science and archaeological research will be:

- focused on our 6 strategic research focus areas, to be measured through personal research plans and publications

- influencing the development of the AM 's collections though our Natural Science Collection Development Strategy that reflects the importance of collections in addressing our research priorities

- used by stakeholders in their research, planning and decision-making, to be measured by the number of data requests and downloads from the Atlas of Living Australia

- in demand by potential partners, collaborators, communicators and end-users (including universities, governments and community groups)

- a critical part of Lifelong Learning and Public Engagement activities at the AM

- properly and sustainably supported financially.

To reach these goals we will:

- use the Research Workforce Plan as the basis for future recruitment and training needs

- ensure that all research scientists have personal research plans that relate research projects to identified research priorities

- identify targets for staff involvement in Public Engagement activities, Public Outreach, Citizen Science and Science Communication through personal research plans

- coordinate research outputs through the AMRI grants office to ensure results are communicated through the relevant media, especially digital media

- formalise working relationships with universities and other research institutions with a view to establishing joint appointments that will expand our reach and effectiveness, provide access to more funding opportunities, and improve information access for current and future Museum staff; a significant proportion of new research staff will be joint appointments

- ensure consistency of our Lifelong Learning programs with the new Australian curriculum and implement new components to showcase our research

- provide communication and presentation training for research staff.
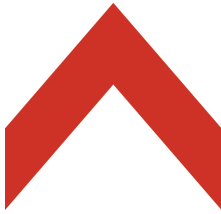
PRIORITY AREA 2: NATURAL SCIENCES COLLECTIONS

The AM's collections support a range of research disciplines including taxonomy, systematics, evolution, biogeography, ecology, biodiversity assessment, conservation, anatomy, morphology, ontogeny, geology, mineralogy, petrology and palaeontology.

Collections also provide information and material for educational and display purposes, and are a key reference tool for studying the biodiversity and geodiversity of Australia and neighbouring regions.

As a natural history museum we have a primary role to protect, develop and provide access to these world-class collections in perpetuity.

We develop, refine and care for the collections and associated information in consultation with our conservators and building facilities staff to provide a safe and secure physical environment.

Because we will always be challenged by resource constraints, improving and better understanding the collections requires engagement with both external and internal partners. In particular we will strive to better utilise volunteer and citizen science network in our research and collection activities.

Physical and virtual access to the collections and associated information needs to be improved and we need to better track the impact of these uses.

It will become increasingly important to promote the use, availability and relevance of collections to researchers and other stakeholders and the use of collections as a resource for training new scientists through traditional and digital means.

By 2017 the collections will be:

- stored to recognised world-best practice standards

- maintained, developed and used in line with resources

- digitised, with collections information available in an open digital format

- tightly integrated with our research and developed so that collections information is able to be easily used to address key biodiversity-related questions

- engaged with the wider community.

To reach these goals we will:

• Implement the Natural Sciences Collection Development Strategy to ensure our approach to acquiring specimens is (a) consistent with identified research priorities and (b) able to support research into key environmental concerns such as the impacts of climate change and invasions of pest species of possible biosecurity concern

• seek funding for, and clear, the backlog of records awaiting input to the database, with a base target of 60,000 records per year

• implement procedures for digitising records as specimens are acquired to ensure that basic records are available for all new specimens, and make information about our collections available in an open digital format

• develop innovative programs for engaging stakeholders in enhancing and interpreting our collections, in collaboration with the AM's Centre for Citizen Science, Lifelong Learning Branch and Public Engagement Division

• provide communication and presentation training for collections staff.

PRIORITY AREA 3: SCIENTIFIC INFRASTRUCTURE

Our science infrastructure directly contributes to scientific discovery and to the enhancement and dissemination of knowledge about our research, collections and ecosystems.

We will continue to develop our collections, research and science facilities through the provision of state-of-the-art infrastructures that support our strategic research focus areas.

Our science infrastructure capability directly contributes to our research priorities through the:

- Collection Informatics Unit, which works to deliver our vast collection data to large national and global information initiatives

- Australian Museum Lizard Island Research Station (LIRS), our internationally acclaimed marine research station located on the northern Great Barrier Reef

- Australian Centre for Wildlife Genomics, AM frozen tissue collection, microscopy and microanalysis units which deliver molecular and imaging data of the highest quality,

- AM Research library and information services, an invaluable resource of books and journals, with rare holdings accessed by the global community.

The Australian Museum Centre for Citizen Science provides us with a platform for engaging new sources of community based volunteer infrastructure through citizen science activities and programs such as Streamwatch and DigiVol. This opens the way for doing science that would otherwise not be possible, building our advocacy base and contributing real scientific outcomes. We are operating not only in a digital age, but also at a time when advances in molecular genomics are proceeding at a frenetic pace. To remain relevant in this environment and in the face of competing priorities we need to keep abreast of these changes so that we can continue to offer our users access to the most sophisticated techniques and expertise.

By 2017 our scientific infrastructure will be:

- a cohesive, cross-fertilising and innovative group harnessing the opportunities offered by digital, molecular, imaging and citizen science revolutions

- a leading provider of biodiversity data, information and resources to Australia and the world

- the provider of choice for wildlife forensics work and expertise

- the premier coral reef research station in Australia

- accessible, with our publications and rare book holdings available to the world through online initiatives including Trove and the Biodiversity Heritage Library.

To reach these goals we will:

- monitor and implement relevant leading-edge R&D techniques and processes to leverage our expertise and infrastructure

- collaborate with other agencies to ensure we have access to the best technologies, including high-performance computing and storage of nationally significant data

- provide necessary training and experience to keep staff at the forefront of novel applications in genomic, imaging, collections and informatics

- maintain NATA certification for the work of the Australian Centre for Wildlife Genomics

- increase the use of LIRS by Museum staff

- enhance our collection management database and spatial analysis capacity and infrastructure through appropriate licensing, targeted training and software development

- develop the capacity to deliver images from our collection database to the Atlas of Living Australia

- host the Australian Citizen Science Association and lead citizen science activities in the Australian and the Pacific region.

PRIORITY AREA 4: DIGITAL ACCESS TO MUSEUM COLLECTIONS AND SCIENCE

Digital technology provides new ways to engage stakeholders in museum science and the exploration of our collections.

We will use these technologies in new ways for our staff and stakeholders to access and interact with our collections and science to better understand our natural world, to address environmental issues, and to educate our current and future generations.

The majority of our 18 million natural history and cultural specimens and objects are not on public display or easily accessed. Digital technology provides opportunities for overcoming this challenge and for engaging more stakeholders in the science and exploration of these collections.

Achieving our objectives will require us to provide a range of collection information digitally. It will also require us to develop digital products and tools that support our research and engagement priorities and provide appropriate information on data quality and reliability, so that users can make informed decisions on data usage.

To counter declining resources we will pursue and enhance partnerships through innovative solutions while striving to ensure the required resources are available to deliver these aspirations.

By 2017 the AM will be:

- a leader of change in enhancing and maintaining the emerging generation of digital museums

- an innovator in how we acquire, manage and make available information, and how we network with partner natural history museums

- a recognised custodian and advocate of the importance of collections and research as foundations of authoritative digital information associated with biological and geological collections.

To reach these goals we will:

- create 1000 images of our holotype specimens each year

- provide access to our tissue collections metadata through the Global Genomics Biodiversity Network

- deliver 40,000 specimen images per year to users through the Atlas of Living Australia

- conduct a pilot project that prototypes the development of 3d models for engaging the public and creating new opportunities for the scientific community.

- develop new ways of engaging the public in digitising our collections through online tagging of images with biological traits

PRIORITY AREA 5: SCIENCE LEARNING AND ENGAGEMENT, INCLUDING CITIZEN SCIENCE

We will provide opportunities for the wider community to explore the natural and cultural world through our collections and research.

Our lifelong learning programs will have far-reaching impacts by improving knowledge of science and promoting positive social change.

Our goal is to maximise the AM's capacity to influence lifelong learning by using our collections and showcasing our science and expert staff. Our programs will highlight the AM's scientific investigations, examine contemporary issues for which science can provide solutions, and inspire our audiences to contribute.

We will use both formal and informal learning approaches, including face-to-face interactions and digital initiatives, to inform and create an environment that stimulates curiosity and motivates learning. We are receptive to feedback from our audiences to ensure we are meeting their expectations.

We will expand our current portfolio for lifelong learning in science festivals, school and tertiary programs, citizen science, outreach endeavours and social media. These initiatives will focus on our research priorities and engage with all learners about the issues affecting geodiversity and biodiversity.

The AM's nationally and internationally recognised collections and expertise provide us with opportunities to collaborate with many organisations, from museums and universities to government departments and community groups. Using our profile and partnerships we can maximise our potential to reach a wider audience more effectively.

Stakeholders who are engaged in science are more likely to understand and participate in critical environmental, social and economic issues. We will involve the community in the science that underlies major issues such as biodiversity loss, the environmental impacts of climate change, environmental sustainability and the implications of new technologies. The AM will continue to be a trusted voice of authority on those aspects of the natural world that lie within its fields of expertise.

By 2017 our science engagement and learning will be:

- defined by a Lifelong Learning strategy that links to our Corporate Strategic Plan

- composed of a suite of innovative face-to-face and online programs that engages the public with contemporary scientific questions and discoveries

- based on cooperation with relevant societies and amateur naturalists with a view to engaging further groups in museum citizen science programs

- consistent with the NSW and Australian school curriculum.

- collaborative, with a strong emphasis on Australian Museum Research Institute science and contemporary issues.

To reach these goals we will:

- establish an international centre of excellence for formal and informal lifelong learning in science and culture.

- Innovate and grow in accordance with the changing technologies and digital literacy.

- Grow audiences and revenue, and remaining relevant in a rapidly changing and competitive marketplace.

- Create partnerships/collaborations with universities, schools and other organisations.

- build upon the excellent standard of customer service and provide an exceptional visitor experience.

- Provide opportunities for all abilities and social backgrounds.

- establish a recognised Professional Development Program for internal and external stakeholders.